Contents

Lightstep

5 minute read page test

This task shows you how to configure Istio to collect trace spans and send them to Lightstep. Lightstep lets you analyze 100% of unsampled transaction data from large scale production software to produce meaningful distributed traces and metrics that help explain performance behaviors and accelerate root cause analysis. At the end of this task, Istio sends trace spans from the proxies to a Lightstep Satellite pool making them available to the web UI. By default, all HTTP requests are captured (to see end-to-end traces, your code needs to forward OT headers even if it does not join the traces).

If you only want to collect tracing spans directly from Istio (and not add specific instrumentation directly to your code), then you don’t need to configure any tracers, as long as your services forward the HTTP headers generated by traces.

This task uses the Bookinfo sample application as an example.

Before you begin

1. Ensure you have a Lightstep account. Sign up for a free trial of Lightstep.

2. If you’re using on-premise Satellites, ensure you have a satellite pool configured with TLS certs and a secure GRPC port exposed. See Install and Configure Satellites for details about setting up satellites.

   For Lightstep Public Satellites or Developer Satellites, your satellites are already configured. However you need to download this certificate to a local directory.

3. Ensure sure you have a Lightstep access token. Access tokens allow your app to communicate with your Lightstep project.

Deploy Istio

How you deploy Istio depends on which type of Satellite you use.

Deploy Istio with On-Premise Satellites

These instructions do not assume TLS. If you are using TLS for your Satellite pool, follow the config for the Public Satellite pool, but use your own cert and your own pool's endpoint (`host:port`).

1. You need to deploy Istio with your Satellite address at an address in the format `<Host>:<Port>`, for example `lightstep-satellite.lightstep:9292`. You find this in your configuration file.
2. Deploy Istio with the following configuration parameters specified:

- `pilot.traceSampling=100`
- `global.proxy.tracer="lightstep"`
- `global.tracer.lightstep.address="<satellite-address>"`
- `global.tracer.lightstep.accessToken="<access-token>"`

You can set these parameters using the `--set key=value` syntax when you run the install command. For example:

```
$ istioctl install \
    --set values.pilot.traceSampling=100 \
    --set values.global.proxy.tracer="lightstep
" \
    --set values.global.tracer.lightstep.addres
s="<satellite-address>" \
    --set values.global.tracer.lightstep.access
Token="<access-token>" \
```

Deploy Istio with Public or Developer

Mode Satellites

Follow these steps if you’re using the Public or Developer Mode Satellites, or if you’re using on-premise Satellites with a TLS certificate.

1. Store your satellite pool’s certificate authority certificate as a secret in the default and `istio-system` namespace, the latter for use by the Istio gateways. Download and use this certificate. If you deploy the Bookinfo application in a different namespace, create the secret in that namespace instead.

   ```
   $ CACERT=$(cat Cert_Auth.crt | base64) # Cert_Auth.crt contains the necessary CACert
   $ NAMESPACE=default
   ```

```
$ cat <<EOF | kubectl apply -f -
  apiVersion: v1
  kind: Secret
  metadata:
    name: lightstep.cacert
    namespace: $NAMESPACE
    labels:
      app: lightstep
  type: Opaque
  data:
    cacert.pem: $CACERT
EOF
```

2. Deploy Istio with the following configuration parameters specified:

```
global:
  proxy:
    tracer: "lightstep"
  tracer:
    lightstep:
      address: "ingest.lightstep.com:443"
      accessToken: "<access-token>"
meshConfig:
  defaultConfig:
    tracing:
      sampling: 100
      tlsSettings
        mode: "SIMPLE"
        # Specifying ca certificate here will moute `lightstep.cacert` secret volume
        # at all sidecars by default.
        caCertificates="/etc/lightstep/cacert.pem"
components:
  ingressGateways:
  # `lightstep.cacert` secret volume needs to be mount at gateways via k8s overlay.
  - name: istio-ingressgateway
    enabled: true
    k8s:
      overlays:
      - kind: Deployment
        name: istio-ingressgateway
        patches:
        - path: spec.template.spec.containers[0].volumeMounts[-1]
          value: |
            name: lightstep-certs
            mountPath: /etc/lightstep
            readOnly: true
        - path: spec.template.spec.volumes[-1]
          value: |
            name: lightstep-certs
            secret:
              secretName: lightstep.cacert
              optional: true
```

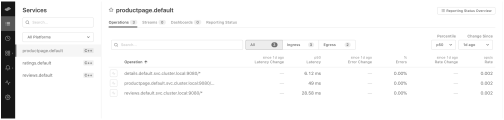
Install and run the Bookinfo app

1. Follow the instructions to deploy the Bookinfo sample application.
2. Follow the instructions to create an ingress gateway for the Bookinfo application.
3. To verify the previous step's success, confirm that you set `GATEWAY_URL` environment variable in your shell.
4. Send traffic to the sample application.

   ```
   $ curl http://$GATEWAY_URL/productpage
   ```

Visualize trace data

1. Load the Lightstep web UI. You’ll see the three Bookinfo services listed in the Service Directory.

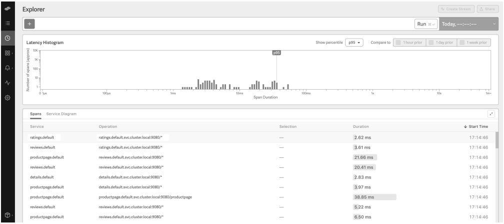


Services	
productpage.default	C++
ratings.default	C++
reviews.default	C++

Operation ↑	since 1d ago Latency Change	p50 Latency	since 1d ago Error Change	% Errors	since 1d ago Rate Change	ops/s Rate
details.default.svc.cluster.local:9080/*	—	6.12 ms	—	0.00%	—	0.002
productpage.default.svc.cluster.local:9080/...	—	49 ms	—	0.00%	—	0.002
reviews.default.svc.cluster.local:9080/*	—	28.58 ms	—	0.00%	—	0.002

Bookfinder services in the Service Directory

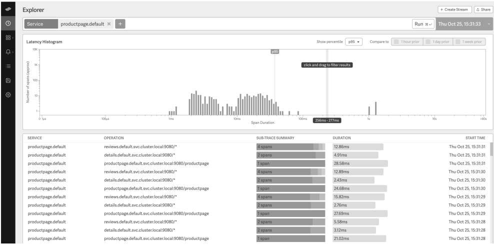
2. Navigate to the Explorer view.



Service	Operation	Selection	Duration	↓ Start Time
ratings.default	ratings.default.svc.cluster.local:9080/*	—	2.62 ms	17:14:46
reviews.default	ratings.default.svc.cluster.local:9080/*	—	3.61 ms	17:14:46
productpage.default	reviews.default.svc.cluster.local:9080/*	—	21.66 ms	17:14:46
reviews.default	reviews.default.svc.cluster.local:9080/*	—	20.41 ms	17:14:46
details.default	details.default.svc.cluster.local:9080/*	—	2.83 ms	17:14:46
productpage.default	details.default.svc.cluster.local:9080/*	—	3.97 ms	17:14:46
productpage.default	productpage.default.svc.cluster.local:9080/productpage	—	38.85 ms	17:14:46
reviews.default	reviews.default.svc.cluster.local:9080/*	—	5.22 ms	17:14:46
productpage.default	reviews.default.svc.cluster.local:9080/*	—	6.50 ms	17:14:46

Explorer view

3. Find the query bar at the top. The query bar allows you to interactively filter results by a **Service**, **Operation**, and **Tag** values.
4. Select `productpage.default` from the **Service** drop-down list.
5. Click **Run**. You see something similar to the following:

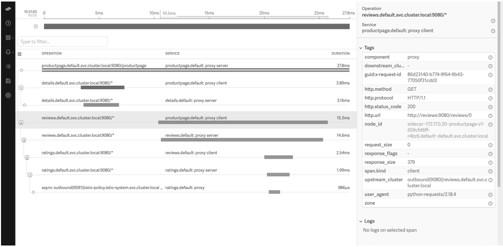


Service: productpage.default

SERVICE	OPERATION	SUB-TRACE SUMMARY	DURATION	START TIME
productpage.default	reviews.default.svc.cluster.local:9080/*	4 spans	12.86ms	Thu Oct 25, 15:31:31
productpage.default	details.default.svc.cluster.local:9080/*	2 spans	4.91ms	Thu Oct 25, 15:31:31
productpage.default	productpage.default.svc.cluster.local:9080/productpage	1 span	28.58ms	Thu Oct 25, 15:31:31
productpage.default	reviews.default.svc.cluster.local:9080/*	4 spans	12.89ms	Thu Oct 25, 15:31:30
productpage.default	details.default.svc.cluster.local:9080/*	2 spans	2.43ms	Thu Oct 25, 15:31:30
productpage.default	productpage.default.svc.cluster.local:9080/productpage	1 span	24.68ms	Thu Oct 25, 15:31:30
productpage.default	reviews.default.svc.cluster.local:9080/*	4 spans	15.82ms	Thu Oct 25, 15:31:29
productpage.default	details.default.svc.cluster.local:9080/*	2 spans	2.76ms	Thu Oct 25, 15:31:29
productpage.default	productpage.default.svc.cluster.local:9080/productpage	1 span	27.69ms	Thu Oct 25, 15:31:29
productpage.default	reviews.default.svc.cluster.local:9080/*	2 spans	5.58ms	Thu Oct 25, 15:31:28
productpage.default	details.default.svc.cluster.local:9080/*	2 spans	3.12ms	Thu Oct 25, 15:31:28
productpage.default	productpage.default.svc.cluster.local:9080/productpage	1 span	21.02ms	Thu Oct 25, 15:31:28

Explorer

6. Click on the first row in the table of example traces below the latency histogram to see the details corresponding to your refresh of the `/productpage`. The page then looks similar to:



OPERATION	SERVICE	DURATION
productpage.default.svc.cluster.local:9080/productpage	productpage.default: proxy server	27.8ms
details.default.svc.cluster.local:9080/*	productpage.default: proxy client	3.89ms
details.default.svc.cluster.local:9080/*	details.default: proxy server	3.16ms
reviews.default.svc.cluster.local:9080/*	productpage.default: proxy client	15.3ms
reviews.default.svc.cluster.local:9080/*	reviews.default: proxy server	14.6ms
ratings.default.svc.cluster.local:9080/*	reviews.default: proxy client	2.54ms
ratings.default.svc.cluster.local:9080/*	ratings.default: proxy server	1.99ms
async outbound|9091||istio-policy.istio-system.svc.cluster.local ...	ratings.default: proxy	986μs

Operation
reviews.default.svc.cluster.local:9080/*

Service
productpage.default: proxy client

Tags

component	proxy
downstream_clu...	-
guid:x-request-id	86d23140-b774-9f64-9b43-77050f31cdd3
http.method	GET
http.protocol	HTTP/1.1
http.status_code	200
http.url	http://reviews:9080/reviews/0
node_id	sidecar~172.17.0.20~productpage-v1-659cfd6ff-r4bz6.default~default.svc.cluster.local
request_size	0
response_flags	-
response_size	379
span.kind	client
upstream_cluster	outbound|9080||reviews.default.svc.cluster.local
user_agent	python-requests/2.18.4
zone	

Logs

No logs on selected span

Detailed Trace View

The screenshot shows that the trace is comprised of a set of spans. Each span corresponds to a Bookinfo service invoked during the execution of a `/productpage` request.

Two spans in the trace represent every RPC. For example, the call from `productpage` to `reviews` starts with the span labeled with the `reviews.default.svc.cluster.local:9080/*` operation and the `productpage.default: proxy client` service. This service represents the client-side span of the call. The screenshot shows that the call took 15.30 ms. The second span is labeled with the `reviews.default.svc.cluster.local:9080/*` operation and the `reviews.default: proxy server` service. The second span is a child of the first span and represents the server-side span of the call. The screenshot shows that the call took 14.60 ms.

Trace sampling

Istio captures traces at a configurable trace sampling percentage. To learn how to modify the trace sampling percentage, visit the Distributed Tracing trace sampling section.

When using Lightstep, we do not recommend reducing the trace sampling percentage below 100%. To handle a high traffic mesh, consider scaling up the size of your satellite pool.

Cleanup

If you are not planning any follow-up tasks, remove the Bookinfo sample application and any Lightstep secrets from your cluster.

1. To remove the Bookinfo application, refer to the Bookinfo cleanup instructions.
2. Remove the secret generated for Lightstep:

```
$ kubectl delete secret lightstep.cacert
```